International Maintenance Review Board Policy Board (IMRBPB)

Issue Paper (IP)

IP Number: IP 193
Initial Date (DD/MMM/YYYY): 28/May/2021
Revision / Date (DD/MMM/YYYY): Rev. 0 / 28/May/2021
Effective Date (DD/MMM/YYYY): 27/Jul/2021
Retroactivity (Y/N): N

Title:	L/HIRF "unacceptable degradation" definition
Submitter:	EASA

Applies To:	
MSG-3 Vol 1	X
MSG-3 Vol 2	X
IMPS	

Issue:

IP 155 recommended to include the following definition of "L/HIRF Component Unacceptable Degradation" to the Glossary of MSG-3 2018.1 Vol 1 and 2:

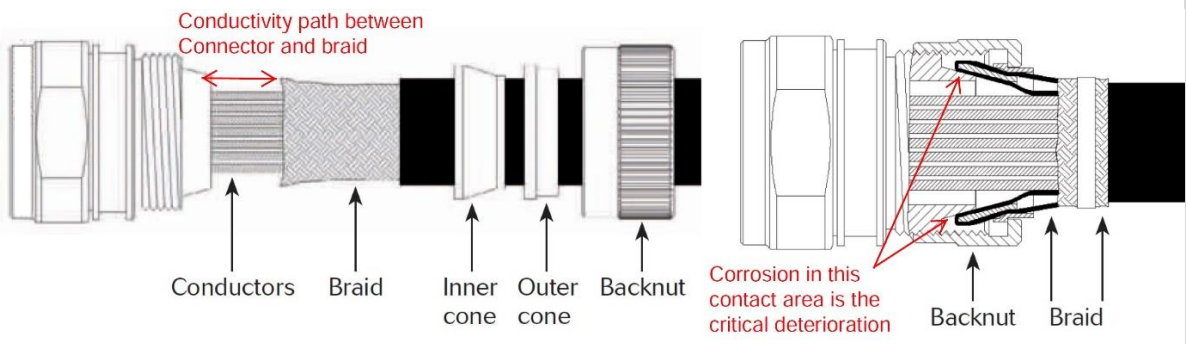
"*A deterioration of an L/HIRF protection component during the lifetime of the aircraft that may lead to its inability to continue to provide the necessary L/HIRF protection capability*".

Unfortunately this definition is still not sufficient, because the Working Group doesn't know "how much" protection is needed to continue to provide the necessary L/HIRF protection capability.

Problem:

Contrary for example to structures, there is no SRM giving allowable damage information and there is no minimum safety factor required, so the type and amount of acceptable degradation is unclear. It is for example also unclear how much effect external corrosion of braids/straps/jumpers, and how much effect corrosion at contact surfaces has on their overall conductivity of the component installation. An amount of corrosion acceptable for structures with respect to strength, may already no longer be acceptable with respect to conductivity.

Additionally, as for example discussed in detail in SAE ARP 5583a, the "real" deterioration of L/HIRF components is often not or not easily detectable, so scheduled maintenance typically is not trying to detect degradation directly, but detecting indication of degradation, e.g. looking for external corrosion of an connector backshell or wire braid in order to detect degradation of the conductivity path between the wire braid and the connector hidden inside the backshell.



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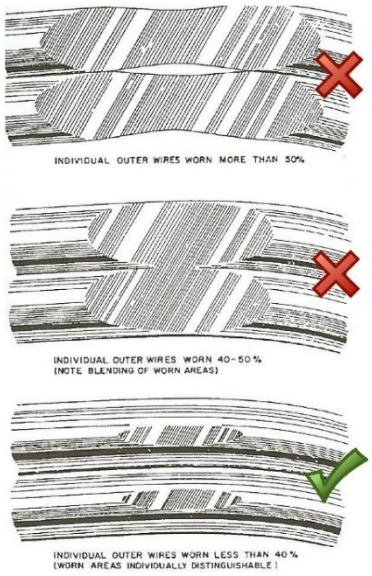
Connector external deterioration

While some external corrosion of connectors/back-shells has no critical impact on the performance of the component, if it is used as **indication** of potentially critical internal corrosion, information about how much corrosion is acceptable, and how much corrosion is an indication for unacceptable degradation of the protection performance needs to be defined.
Only the OEM can provide this information.

To give an example from a different type of component (from FAA guidance material): for control cables, there is clear information about "acceptable degradation", e.g. allowing **chafing damage up to 40%** of individual outer wires, but not allowing any fatigue damage ("Any cable assembly that has **even a single broken wire strand** located in a critical fatigue area must be replaced").

A similar level of information should be provided for L/HIRF protection components:
A clear type and amount of deterioration that is acceptable/unacceptable in order to allow the selection of an appropriate maintenance/inspection task to find that type/level of damage.



Unacceptable degradation of a control cable!

Unacceptable degradation of a bonding strap?

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To define appropriate maintenance requirements, the Working Group needs to be aware of

- The type of protection L/HIRF protection components are supposed to provide (e.g. shielding)
- The mechanism by which L/HIRF protection components do provide protection (e.g. by providing a current path)
- The type of deterioration that L/HIRF protection components can experience
- The way deterioration can be detected (directly or indirectly)
- The type/amount of deterioration that is critical / needs to be detected

Recommendation (including Implementation):

Clarify that the OEM should provide detailed information about how much deterioration of an LHSI / L/HIRF protection component is acceptable and how it can be detected.
Modify **chapter 2.6.1-3** as follows:

Step 3: Identify ~~and~~, list and describe each LHSI protection component

For each LHSI, a list and description of the L/HIRF protection components will be provided by OEM engineering for WG review. This ~~will~~ should include:

- A general description of the installation that may include material and finish.
- The type(s) of protection the L/HIRF protection components do provide (e.g. shielding)
- The mechanism(s) by which the L/HIRF protection components do provide protection (e.g. by providing a low resistance conductivity path)
- The type(s) of deterioration the L/HIRF protection components can experience (e.g. chafing of braids, corrosion of contact areas)

A process specification may be used to support the component installation description. Component specifications may be used to describe their performance characteristics.

Step 8: Assess component degradation modes and mitigations

An assessment process will be developed by the OEM and utilized by the working group to determine if there is a potential for unacceptable degradation of the protection components (including mitigation) due to ED/AD. ~~Such mitigation within the installed environment may eliminate requirement for dedicated maintenance.~~

The following should be assessed as minimum:

- The way deterioration can be detected (directly or indirectly)
- The type / amount of deterioration that is critical / needs to be detected

Mitigations within the installed environment may eliminate requirement for dedicated maintenance.

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IMRBPB Position:	
Date:	28 May 2021
Position:	Agreed, closed in 2021 meeting as IP193
Recommendation for Implementation:	As per effective date

Status of the Issue Paper:	X	Active
		Incorporated in MSG-3 / IMPS (with details)
		Archived